The Response Action Plan for the

Operable Unit One (OU-1) Landfill Area

At the Miamisburg Closure Project

FINAL

JULY 2006

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I . PURPOSE

The purpose of this response action plan (RAP) is to: 1) describe the selected strategy for conducting additional cleanup of the operable unit one (OU-1) landfill area; and 2) summarize the supporting evaluation that serves as the basis for the selected strategy. This action will be conducted as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) removal under Section 104 of the Federal Facility Agreement between the United States Environmental Protection Agency (US EPA) and the Ohio Environmental Protection Agency (OEPA)

As with previous cleanup at the Miamisburg Closure Project, this action will be performed with the dual oversight of the US EPA and the OEPA.

II. BACKGROUND

The OU-1 landfill area occupies approximately four acres of land in the southwestern portion of the original Mound Plant property. The OU-1 area includes the "historic landfill" that was used to dispose of general trash and liquid wastes from 1948 to 1974. During the mid-1950s, potentially contaminated Dayton Unit salvage materials consisting of steel and metal debris, polonium (Po)-210-contaminated sand from research and production activities, and approximately 2,500 empty, crushed drums (55 gallon) that had been used to store thorium wastes were buried in the southwest corner of OU-1. An overflow pond was constructed in the OU-1 area during 1977 and 1978 that partially covered the historic landfill. The portion of the historic landfill wastes excavated during construction of the pond, principally trenches that had been used to dispose of non-hazardous wastes, was relocated and encapsulated in a sanitary landfill over top a portion of the historic landfill area (see Figure 1). No site wastes were disposed of in OU-1 after 1974.

In 1989, the Mound site was placed on the US EPA's National Priorities List (NPL) as a result of the volatile organic compounds (VOCs) in groundwater beneath the OU-1 landfill area. Pursuant to this NPL designation, a Federal Facilities Agreement (FFA) was executed between the DOE, and the US EPA in October 1990. The OEPA became a party to this agreement in 1993. Subsequent to the signing of this agreement, a CERCLA Record of Decision (ROD) was signed by the three agencies in June 1995. The 1995 ROD selected a groundwater pump-and-treat system to collect, treat and dispose of groundwater contaminated with VOCs which represented the principal risk concern.

The goal of the remedy was to control and reduce (to drinking water standards) the contaminant concentrations in the groundwater beneath OU-1 and prevent contaminant movement into the Buried Valley Aquifer (BVA) which serves as a drinking water source for some area residents. The agencies determined the soils within the OU-1 area would not pose an unacceptable risk to a future outdoor industrial worker with appropriate institutional controls in place. At the time the ROD was signed, excavation and treatment of the residual subsurface contaminants within the OU-1 area was not considered practicable given the diffuse nature of contamination and the lack of any identifiable contamination "hot spots." Lastly, the ROD required a CERCLA five-year review of the remedy as long as contaminants above health-based levels remained within the OU-1 area.

The groundwater pump-and-treat system was installed in 1996. Shortly thereafter, DOE installed a soil vapor extraction (SVE) system to treat residual VOCs in soils and accelerate remediation of the site. Based on the results of the first CERCLA five-year review completed in 2001, which found a continuing drop in the VOC concentrations within the OU-1 compliance boundary, the agencies concluded the OU-1 remedy was functioning as intended and designed, and was protective of human health and the environment.

During the summer of 2005, a significant portion of the crushed thorium drums, known as potential release site (PRS) -11, was removed within the southwest corner of the OU-1 landfill area, and was subsequently backfilled with clean soil.

Although the 2001 CERCLA five-year review found the OU-1 remedy to be protective, the Miamisburg Mound Community Improvement Corporation (MMCIC) - the entity responsible for the , development and management of the Mound property as part of a 1998 sales agreement - and the City of Miamisburg remained concerned over the potential impact of the OU-1 landfill area on the need to expand an adjacent road and future plans to construct a building in the OU-1 area. In response to these community concerns, Congress directed the DOE to take additional remedial actions at OU-1 and appropriated $30,000,000.00 to execute this work. The DOE and MMCIC workedcollaborateively to develop and evaluate response options, and the DOE issue a Proposed Response Action Plan (PRAP) for public comment on April 20, 2006. Other than minor editorial recommendations submitted by MMCIC, no formal comments on the PRAP were received during the April 20, 2006 to May 18, 2006 public comment period.

Supporting documentation on OU-1 is available for public review at the Mound site information repository located at 955 Mound Road, Miamisburg, Ohio 45342. The hours of operations are Monday through Thursday 8:00 am-5:00 pm.

III. CURRENT SITE CONDITIONS

Since the completion of the OU-1 remedial investigation and feasibility study (that served as the basis for the 1995 selected remedy), a significant amount of additional information has been collected that has improved the agencies' understanding of the OU-1 area, including: 1) performance monitoring data from the SVE and pump-and-treat systems; 2) ground water and soil gas monitoring by a team of national experts assisting the agencies in evaluating the appropriateness and viability of transitioning the pump-and-treat remedy to a natural attenuation remedy; and 3) VOC soil sampling conducted by the OEPA as part of the 2005 thorium drum (PRS-11) removal. A review of existing OU-1 data was conducted in 2003 by the OU-1 Technical Team, a group composed of DOE, EPA, OEPA, MMCIC, City of Miamisburg, and other community-based stakeholders. The recommendations from the OU-1 Technical Team's June 2004 report were considered by the agencies in the development of the *OU-1 Mound 2000 Core Team Technical Memorandum* (May 2005) prepared to support further evaluation of the existing OU-1 remedy. Lastly, following Congressional direction to DOE to conduct further remedial actions at OU-1, the DOE and MMCIC have been working collaboratively to further review both historical and newly-generated information in an attempt to refine an understanding of current site conditions within the OU-1 landfill area, and to support the selection of a response action. The results of the above efforts are summarized below.

The remaining soil and waste materials believed to be residing within OU-1 are illustrated in Figure 2) and briefly discussed in the following sections. The specific locations of the waste materials within OU-1 can not be fully ascertained given the history of activities that took place and therefore, the specific volumes associated with each of the waste areas illustrated in figure 2 are uncertain. Although volume estimates have been generated to support selection of a response action, actual volumes will not be known until excavation, and confirmatory sampling occurs.

Site sanitary landfill - The site sanitary landfill has a soil cover, cap and liner and is surrounded and supported by a berm of soil. The cover and berm consist of soil (presumed to be clean) currently supporting a vegetative cover of grasses and shrubs. It should be noted that Th232 contamination was found within the berm during the PRS 11 excavation. This was presumably due to the smearing of Th232 contaminated material along the bore hole during previous investigations. The cap and liner consist of approximately 3 feet of low-permeable clay rich material or glacial till. The clay rich material was from locations within and immediately adjacent to the historic landfill area. The excavated clay rich material used in the liner was partially mixed with burned and unburned debris from the historic landfill area.

The sanitary cell is reported to contain mostly office and cafeteria wastes, soils, and some bioassay wastes, which were relocated from a series of solid waste disposal trenches east of the historic landfill area. Sediments from the site drainage ditch (which may have contained Pu-238, ZnCrO4, Th-232, and U-238) may have been relocated into the cell as well, documents report that the wastes were screened at 100 pCi/g for plutonium-238 prior to placing it into the cell The estimated volume of the cell contents is approximately 16,000 cubic yards. The estimated volume of the landfill cover and berm is around 48,500 cubic yards.

Thorium drum (PRS-11) area - In the 1950s approximately 2500 empty 55-gallon drums contaminated with thorium were crushed and buried in a trench in the southwest corner of OU-1. As part of a separate disposal operation in 1965, sand contaminated with polonium-210 (a residual product of the polonium research and production conducted in the early 1950s) was also placed in the depression. Because of its short half-life, Polonium is not likely to be present. During the summer of 2005, approximately 5,400 cubic yards of waste materials, 1,400 of which was believed to be contaminated with thorium, were exhumed from the thorium drum area (total excavation of the area was prevented by the presence of the site sanitary landfill berm which the agencies did not want to disturb at the time of the excavation). In addition to the empty crushed thorium drums, examples of other waste found and excavated include: wood, brick, glass, lab bottles, sealed intact bottles with solvents and mercury, I-beam, utility pole, tank, personal protective clothing, mercury contaminated material, solvent contaminated material, material contaminated with plutonium 238, uranium 238, radium 226, lead 210, and thorium 232. The estimated volume of residual waste materials in this area is approximately 1,000 cubic yards.

VOC "hot spot" area - The OU-1 landfill area is known to be the principal source of VOC contamination in the ground water. Although the ground water pump-and-treat system and SVE system have removed over 4,000 pounds of VOCs,

recent sampling conducted as part of the thorium drum removal detected elevated levels of VOC contaminants in the southwest quadrant of the OU-1 area. The estimated volume of this VOC hot spot area is approximately 2,500 cubic yards.

Dayton unit trench – In 1954, salvage material from several buildings in Dayton used for research purposes (Dayton unit) was disposed in an excavated trench along the southern boundary of the OU-1 area. The Dayton unit trench contains buried wood ash and debris from a fire that had consumed the polonium-contaminated flooring from the Dayton units. Since Polonium-210 has a half-life of 138 days, it would no longer be present as a contaminant unless radiological parent material is present. Lead-210 (half-life of 22 years) may have been used in one of the processes to produce Polonium 210 (a daughter of Lead 210) and may be present in the trench, decaying to Polonium 210. Bismuth 210m may also be present as a trace contaminant. The estimated volume of the Dayton trench area is approximately 3,600 cubic yards.

Remaining historic landfill area – The remainder of the historic landfill contains a variety of wastes, including ordinary laboratory, office and kitchen wastes, along with sediments containing heavy metals (beryllium and mercury), plating wastes, oils and chlorinated and non-chlorinated solvents. The estimated volume of the historic landfill area (not including the thorium drum, VOC hotspot areas, and Dayton unit trench) is estimated to be between 25,000 and 30,000 cubic yards

IV. RESPONSE ACTION OBJECTIVES

Consistent with Congressional direction regarding further cleanup of OU-1, the primary response objective is to remove as much of the remaining waste and debris as possible given the $30,000,000.00 made available to conduct this work. Because of the uncertainties that exist with respect to the volumes and types of waste materials present, the actual cost to exhume and properly dispose of these wastes can not be fully ascertained at this time. Therefore, in recognition of the uncertainty with how much of these materials will ultimately be removed from the site, the DOE in coordination with MMCIC has established the following waste removal priorities: 1) thorium drum (PRS-11) area; 2) VOC hot spot area; 3) historic landfill area; 4) Dayton unit trench; and 5) site sanitary landfill.

V. EVALUATION OF RESPONSE OPTIONS

Since the primary response objective is to maximize the removal of the highest priority waste and debris from the OU-1 area, the focus of the response evaluation involved various excavation strategies and associated off-site disposal options. Although containment-based alternatives such as enhancing the existing soil cover or constructing additional, engineered barriers were not evaluated since such alternatives would not comply with Congressional intent to promote industrial reuse, an important consideration for each of the excavation response options outlined below is the extent of soil cover that might be required should allocated funding be insufficient to remove all the wastes posing a hazard from the site.

Although a variety of excavation strategies were initially identified, the various options were categorized into one of the three general approaches. described below, and then compared against the three selection criteria listed in Highlight 1.

HIGHLIGHT 1. RESPONSE ACTION SELECTION CRITERIA

- Effectiveness – Addresses: a) the magnitude of residual risk and the ability of the action to maintain long-term protection; and b) the potential adverse effects on human health and the environment during implementation of the action and the mitigation measures that can be taken to minimize those potential impacts; and c) compliance with existing standards and regulations.
- Implementability – addresses the technical and administrative feasibility of the remedial action, including the availability of the materials and services to implement the action.
- Costs – addresses the capital costs (and the long-term operation and maintenance costs of the action if applicable).

Option 1 – This option would involve the following steps: 1) excavation and off-site disposal of the site sanitary cell contents (the landfill cover and berm materials would be stockpiled on site for reuse as cover if needed, or for re-contouring purposes); 2) excavation of the thorium drum /PRS-11 area and offsite disposal in a permitted facility; 3) excavation of the VOC hotspot area and off-site disposal in a permitted facility; 4) excavation of the remaining historic landfill area and off-site disposal in a permitted facility; 5) excavation of the Dayton unit trench and off-site disposal in a permitted facility; and 5) re-contouring using stockpiled cover and berm soils and additional clean fill as needed.

Option 2 – In essence, option 2 is the mirror of option 1 with the exception that the contents of the sanitary landfill are stockpiled on-site until the other higher priority waste areas are excavated and disposed off-site in appropriately-permitted facilities.

Once the other wastes areas have been removed from the site, the stockpiled sanitary landfill contents would then be disposed off-site in an appropriate facility. This option is intended to manage the uncertainty in the volumes (and therefore costs) of removing the higher priority wastes, and thus ensures that should funds be insufficient to remove all the wastes, only those wastes thought to pose lower risk would remain on site. Any remaining sanitary landfill contents would be used as fill in the excavated area, and as in option 1, the stockpiled landfill cover and berm soils would be used as cover and for re-contouring purposes

Option 3 – This option would involve starting excavation on the southern and most western end of the OU-1 landfill area (where the highest priority wastes are located) and excavating across the site. Under this option, the sanitary landfill cover and contents would be removed as necessary (either stockpiled or taken offsite) to access the highest priority wastes. As in option 1 and 2, the actual volume of waste materials removed would be determined by the encountered wastes types and the associated sampling and disposal costs. As in the previous approaches, the stockpiled sanitary landfill cover and berm soils would be used for cover and re-contouring purposes.

Criteria Analysis

Effectiveness - In general, any of the three approaches is anticipated to result in a significant reduction in the amount of wastes currently located within OU-1. Although it is uncertain whether funding is sufficient to remove all the wastes, the emphasis on removing the wastes with the highest hazard is anticipated to significantly mitigate any long-term protectiveness concerns. All options involve the use of a soil cover for re-contouring, and if needed, to cover any wastes remaining within OU-1 to prevent exposure through direct contact. Accordingly, implementation of the selected response will require careful monitoring of incurred costs as exhumation of the wastes proceeds to ensure adequate funds remain to implement any necessary measures to return the site to a fully protective state.

As with any remedial work involving the excavation and transport of hazardous materials, there is the potential for short-term, impacts (e.g., air emissions, runoff) that have to be carefully managed during implementation of the project. With the exception of the solid waste materials believed to be present in the site sanitary landfill and portions of the historic landfill area, the principal contaminants (metals, low-level wastes and VOC wastes) to be managed (exhumed, sampled and segregated for shipment to offsite disposal facilities) as part of this action are similar in nature to the wastes that have previously and safely been exhumed and removed from the site over the past decade of cleanup. The waste sampling and management protocols used to protect workers, and the mitigation measures (air monitoring, dust suppression, run-off controls, vehicular decontamination, etc.) that will be taken to ensure there are no uncontrolled releases from the site while this work proceeds, will be incorporated into a workplan for EPA and OEPA review and approval as appropriate prior to initiation of the work.

Potentially applicable or relevant and appropriate requirements for this response action are summarized in Table 1.

Implementability – The work necessary to implement this response action involves field-proven practices, engineered safeguards and administrative controls. All materials and services needed to conduct the work are readily available.

Costs – Based on the estimated costs to transport and dispose of the OU-1 waste areas in off-site permitted facilities (see Table 1), any of the options would be expected to require the entire allocated funding of $30,000,000.00 to implement.

Table 1.

Estimated Costs for the Exhumation, Characterization, Transport and Disposal of OU-1 Waste Materials*

Waste Area	Assumed disposal	Direct Cost in $Millions
Sanitary landfill.	sanitary wastes	4-7
Thorium drum/PRS-11s.	low-level rad	1-3
VOC hot spot.	low-level rad & mixed waste	2-3
Dayton unit	low-level rad	2-3
Historic landfill.	low-level rad	25-29

*Estimates do not reflect support and other costs such as the on-site lab, decontamination facility, final grading, administrative, overhead, and contractor fee.

VI. SELECTED RESPONSE STRATEGY

The DOE, in consultation with MMCIC, has selected an excavation-based response action to satisfy Congressional direction for conducting additional cleanup of the OU-1 landfill area. However, the DOE has not yet decided on a specific excavation strategy. The DOE and MMCIC believe the evaluation process to select a contractor to conduct this work, which is currently underway, will result in other useful information and ideas that may facilitate which excavation approach to pursue. As clarified in the option evaluation process, the identified approaches are fundamentally the same in terms of the nature of the response, and sufficiently similar with respect to their performance against the selection criteria, that any of the options would constitute an acceptable approach. Prior to initiating excavation activities, a site-specific work plan, outlining the specific measures that will be taken to manage any potential environmental releases during the response, will be prepared to assist EPA and OEPA in planning their oversight activities.

VII. REMAINING CLEANUP DECISIONS

Following completion of work in the OU-1 landfill area, the existing spoils area (PRS 282 -which will continue to be used as a soil staging area during OU-1 remediation) and the existing rail yard (PRS-441 - which will be used to load boxcars to haul wastes by rail to off-site disposal facilities) will be remediated as necessary. The proposed cleanup plans for these areas will be prepared by the DOE, EPA and OEPA and presented to the public for comment prior to initiating these final phases of the cleanup.

Confirmatory sampling performed as part of the OU-1 work will be used by the DOE, EPA and OEPA to ensure the OU-1 landfill area remains fully protective of human health and the environment following completion of this action. Once the selected response action is complete and the nature and extent of any remaining waste and contamination is known, a determination will be made as to whether additional institutional controls, other than the existing industrial land use controls for the entire site, are needed to ensure the OU-1 area remains protective

The existing pump-and-treat remedy will continue to operate until the hydrogeological conditions are believed to have "stabilized" following the excavation activities (approximately 6 months). Once a decision is made to turn the pump-and-treat system off in order to assess the impact of this action on ground water contamination, ground water monitoring data will continue to be collected and evaluated to ensure contaminant concentrations do not rebound. Based on existing information that demonstrated ground water concentrations were already decreasing as a result of the actions taken previously, it is DOE's expectation that the pump-and-treat remedy will no longer be needed upon completion of this action since the majority if not all of the more hazardous materials will have been removed from the area. Should the evaluation and ground water monitoring data support such a conclusion, the remedy will be transitioned to a monitored natural attenuation phase if levels are still in excess of drinking water standards but not sufficiently high to warrant continued use of the pump-and-treat system. Any changes to site conditions resulting from the current action, or modifications to the existing site controls or the pump-and-treat remedy, will be documented in a proposed amendment to the ROD and presented to the public for comment.

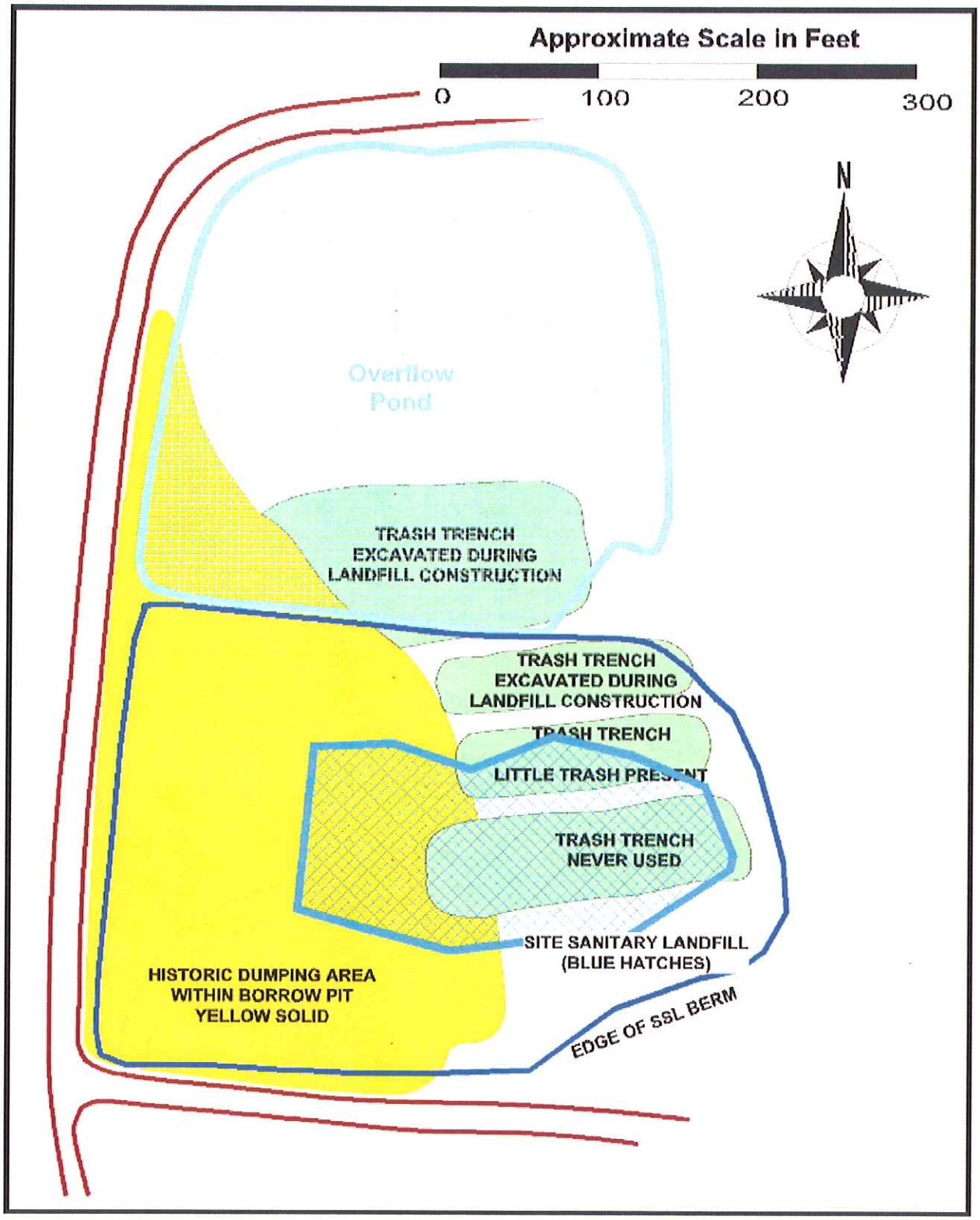

Figure 1: Location of Historic Landfill and Trenches

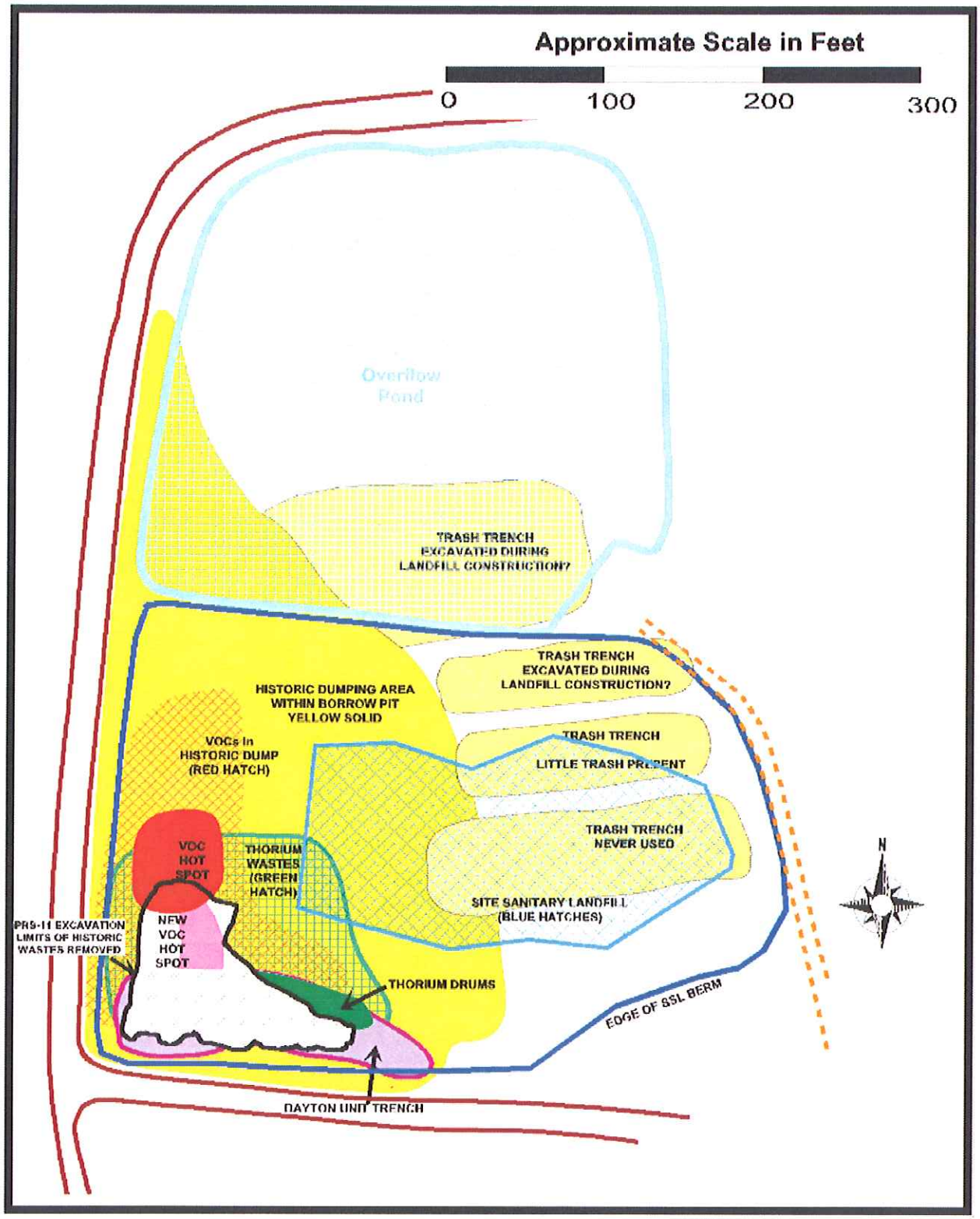

Figure 2: Estimated Locations of Remaining Waste Materials

TABLE 2.

POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) AND TO BE CONSIDERED INFORMATION FOR OU-1 REMEDIATION*

ARARS

Air Quality

- 40 CFR Part 61 Subpart H: National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.
- Ohio Administrative Code (OAC) 3745-15-07(A): Air Pollution Nuisances Prohibited.
- OAC 3745-17-02 (A, B, C): Particulate Ambient Air Quality Standards
- OAC 3745-17-05: Particulate Non-Degradation Policy
- OAC 3745-17-08: (A1), (A2), (B), (D): Emission Restrictions for Fugitive Dust

Solid Wastes

- OAC 3745-27-13(H)(4) Testing of wastes for disposal or treatment
- OAC 3745-27-13(H)(6) Replacement of excavated wastes

Transportation

49 CFR 172, 173: Department of Transportation (DOT) hazardous material transportation and employee training requirements.

Storm water Runoff

- National Pollutant Discharge Elimination System (NPDES) Permit No. 1IO00005*HD, June 1998

Hazardous Waste

- OAC 3745-52-11: Hazardous waste determination
- OAC 3745-55-71 through 74, 3745-52-34(C)(1)(b): Container management
- OAC 3745-52-20 through 33: Hazardous waste transportation

To Be Considered

- EPA/230/02-89/042: Methods for Evaluating the Attainment of Cleanup Standards.
- DOE Order 5400.5: Radiation Protection of the Public and the Environment

Worker Safety

- 29 CFR Part 1910: Occupational Safety and Health Act (OSHA) - General Industry Standards
- 29 CFR Part 1926: OSHA - Safety and Health Standards
- 29 CFR Part 1904: OSHA - Record keeping, Reporting, and Related Regulations

*Other standards or requirements related to the actual implementation of the RA may subsequently be identified during the design phase and will be incorporated into the Work Plans for this remedial action.